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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/782,727
Filing Date: February 18, 2004
Appellant(s): LINDFORS ET AL.

Rabinder N. Narula
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed September 14, 2007 appealing from the Office action mailed August 28, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner.

Claims 1-43 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

WITHDRAWN OBJECTIONS

While not an appealable issue, the objection to the drawings pursuant to 37 CFR 1.83(a) has been withdrawn.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 6736408 B2	Olgado; Donald J. K. et al.	05-2004
US 6025013 A	Heming; Martin et al.	02-2000
US 5370709 A	Kobayashi; Norio	12-1994
US 5010842 A	Oda; Masao et al.	04-1991

US Patent Application 10/428,207

(9) Grounds of Rejection

The following grounds of rejection are applicable to the appealed claims:

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., In re Berg, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

> Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-43 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-43 of copending Application No. 10/428,207. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of 10/428,207 do not require an integral "plate", whereas the claims of the present invention are directed to a plate. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the gas conduits of 10/428,207 integral. Further, it is established that the use of a one piece construction instead of interconnected components is obvious (In re Larson, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965), MPEP 2144.04).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-9, 11, 13, 16, 18, 20, 21, 30-32, 34-36, and 39-42 are rejected under 35 U.S.C. 102(b) as being anticipated by Heming; Martin et al. (US 6025013 A). Heming teaches an apparatus (Figure 1; column 11; lines 10-30) for depositing a thin film on a substrate (1; Figure 1; column 11; lines 10-30), comprising: a reaction chamber (4; Figure 1; column 11; lines 10-30) having a reaction space (between 2 and 11; Figure 1; column 11; lines 10-30); a substrate holder (5; Figure 1; column 11; lines 10-30) for holding the substrate (1; Figure 1; column 11; lines 10-30)

within the reaction space (between 2 and 11; Figure 1; column 11; lines 10-30); a gas outlet (13-15; Figure 1; column 11; lines 10-30) in fluid communication with the reaction space (between 2 and 11; Figure 1; column 11; lines 10-30); a gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) having a first side (12; Figure 1; column 11; lines 10-30) and a second side (top of 15; Figure 1; column 11; lines 10-30), positioned within the reaction chamber (4; Figure 1; column 11; lines 10-30), the plate comprising: a plurality of first passages (bifurcated 21 within 10; Figure 1; column 11; lines 10-30) machined therein being in fluid communication with a first reactant gas source (28; Figure 1; column 11; lines 10-30) and a purge gas source (27; Figure 1; column 11; lines 10-30), the first passages (bifurcated 21 within 10; Figure 1; column 11; lines 10-30) communicating with a plurality of first apertures (14; Figure 1; column 11; lines 10-30) spaced along the first passages (bifurcated 21 within 10; Figure 1; column 11; lines 10-30), the first apertures (14; Figure 1; column 11; lines 10-30) opening to the reaction space (between 2 and 11; Figure 1; column 11; lines 10-30); a plurality of second passages (bifurcated 22 within 10; Figure 1; column 11; lines 10-30) machined therein being in fluid communication with a second reactant gas source (28; Figure 1; column 11; lines 10-30) and a purge gas source (27; Figure 1; column 11; lines 10-30), the second passages (bifurcated 22 within 10; Figure 1; column 11; lines 10-30) communicating with a plurality of second apertures (15; Figure 1; column 11; lines 10-30) spaced along the second passages (bifurcated 22 within 10; Figure 1; column 11; lines 10-30), the second apertures (15; Figure 1; column 11; lines 10-30) opening to the reaction space (between 2 and 11; Figure 1; column 11; lines 10-30); and a plurality of third apertures (16; Figure 1; column 11; lines 10-30) extending from the first side (12; Figure 1; column 11; lines 10-30) to the second side (top of 15; Figure 1; column 11; lines 10-30) of the

gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), allowing gas to pass therethrough, as claimed by claim 1

Heming further teaches:

i. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, wherein: the first passages (bifurcated 21 within 10; Figure 1; column 11; lines 10-30) include a first main passage (straight portion of 21 within 10; Figure 1; column 11; lines 10-30) connected to a plurality of first distributor passages (14; Figure 1; column 11; lines 10-30); and the second passages (bifurcated 22 within 10; Figure 1; column 11; lines 10-30) include a second main passage (straight portion of 22 within 10; Figure 1; column 11; lines 10-30) connected to a plurality of second distributor passages (15; Figure 1; column 11; lines 10-30), as claimed by claim 2

ii. The apparatus (Figure 1; column 11; lines 10-30) of claim 2, wherein the first main passage (straight portion of 21 within 10; Figure 1; column 11; lines 10-30) is formed along a first side (12; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) and the second main passage (straight portion of 22 within 10; Figure 1; column 11; lines 10-30) extends parallel to the first main passage (straight portion of 21 within 10; Figure 1; column 11; lines 10-30) along an opposite side of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 3

iii. The apparatus (Figure 1; column 11; lines 10-30) of claim 3, wherein the first distributor passages (14; Figure 1; column 11; lines 10-30) extend parallel to the second distributor passages (15; Figure 1; column 11; lines 10-30) and extend perpendicularly from the first

and second main passages (straight portion of 21, 22 within 10; Figure 1; column 11; lines 10-30), respectively, as claimed by claim 4

iv. The apparatus (Figure 1; column 11; lines 10-30) of claim 4, wherein the first distributor passages (14; Figure 1; column 11; lines 10-30) alternate with the second distributor passages (15; Figure 1; column 11; lines 10-30) along an axis parallel to the first and second main passages (straight portion of 22, 23 within 10; Figure 1; column 11; lines 10-30), as claimed by claim 5

v. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, further comprising an exhaust plate (10; Figure 1; column 11; lines 10-30) having a first side (12; Figure 1; column 11; lines 10-30) and a second side (top of 15; Figure 1; column 11; lines 10-30), the second side (top of 15; Figure 1; column 11; lines 10-30) of the exhaust plate (10; Figure 1; column 11; lines 10-30) being flush with the first side (12; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 6

vi. The apparatus (Figure 1; column 11; lines 10-30) of claim 6, wherein the gas exhaust plate (10; Figure 1; column 11; lines 10-30) includes a plurality of exhaust apertures (16; Figure 1; column 11; lines 10-30) aligned with the plurality of third apertures (16; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 7

vii. The apparatus (Figure 1; column 11; lines 10-30) of claim 7, wherein the first and second passages (bifurcated 22, 21 within 10; Figure 1; column 11; lines 10-30) comprise grooves (passages 14, 15) on the first side (12; Figure 1; column 11; lines 10-30) of the

gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), the exhaust plate (10; Figure 1; column 11; lines 10-30) overlying and sealing the grooves (passages 14, 15) to enclose the first and second passages (bifurcated 22 within 10; Figure 1; column 11; lines 10-30), as claimed by claim 8

viii. The apparatus (Figure 1; column 11; lines 10-30) of claim 7, wherein the exhaust plate (10; Figure 1; column 11; lines 10-30) includes a recess (16; Figure 1; column 11; lines 10-30) defined in the first side (12; Figure 1; column 11; lines 10-30) of the exhaust plate (10; Figure 1; column 11; lines 10-30) and an exhaust conduit (17; Figure 1; column 11; lines 10-30) communicating from the recess (16; Figure 1; column 11; lines 10-30) to an edge of the exhaust plate (10; Figure 1; column 11; lines 10-30), as claimed by claim 9

ix. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, wherein the first (14), second (16) and third apertures (16; Figure 1; column 11; lines 10-30) are interspersed with one another and substantially uniformly distributed across the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) to provide gas flow substantially uniformly across the substrate holder (5; Figure 1; column 11; lines 10-30), as claimed by claim 11. When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

x. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, wherein the substrate holder (5; Figure 1; column 11; lines 10-30) is an end effectors of a wafer handler (42; Figure 2; column 12; lines 1-5), as claimed by claim 13

xi. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, wherein the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) is positioned below the substrate holder (5; Figure 1; column 11; lines 10-30), as claimed by claim 16

xii. The apparatus (Figure 1; column 11; lines 10-30) in claim 1, wherein the gas outlet (13-15; Figure 1; column 11; lines 10-30) is fluidly connected to a vacuum, as claimed by claim 18

xiii. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, further comprising controls (18, 19, 23-26; Figure 1; column 11; lines 10-30) for alternately providing first reactant to the first plurality of passages while stopping second reactant flow to the second plurality of passages and providing second reactant to the second plurality of passages while stopping first reactant flow to the first plurality of passages, as claimed by claim 20. Applicant's claim limitation of "for alternately providing first reactant to the first plurality of passages while stopping second reactant flow to the second plurality of passages and providing second reactant to the second plurality of passages while stopping first reactant flow to the first plurality of passages" are claim requirements of intended use. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re

Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

xiv. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, wherein the first (14) and second (15) plurality of passages comprise open grooves (outlets) on the first side (12; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 21

xv. The showerhead assembly (10-12; Figure 1; column 11; lines 10-30) of claim 28, wherein the exhaust plate (10; Figure 1; column 11; lines 10-30) has a first side (12; Figure 1; column 11; lines 10-30) and a second side (top of 15; Figure 1; column 11; lines 10-30), the second side (top of 15; Figure 1; column 11; lines 10-30) of the exhaust plate (10; Figure 1; column 11; lines 10-30) configured to seal the surface grooves (passages 14, 15) of the first (21) and second (22) network of passages of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) when the second side (top of 15; Figure 1; column 11; lines 10-30) of the exhaust plate (10; Figure 1; column 11; lines 10-30) is mated with the first side (12; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 30

xvi. The showerhead assembly (10-12; Figure 1; column 11; lines 10-30) of claim 30, wherein the exhaust plate (10; Figure 1; column 11; lines 10-30) further comprises a recess (16; Figure 1; column 11; lines 10-30) formed in the first side (12; Figure 1; column 11; lines 10-30) of the exhaust plate (10; Figure 1; column 11; lines 10-30), the recess (16; Figure 1; column 11; lines 10-30) being in communication with each of the exhaust apertures

(16; Figure 1; column 11; lines 10-30) at a bottom of the recess (16; Figure 1; column 11; lines 10-30), as claimed by claim 31

xvii. The showerhead assembly (10-12; Figure 1; column 11; lines 10-30) of claim 31, wherein the exhaust plate (10; Figure 1; column 11; lines 10-30) further comprises outlet conduits (17) extending in fluid communication between the recess (16; Figure 1; column 11; lines 10-30) and an edge of the exhaust plate (10; Figure 1; column 11; lines 10-30), as claimed by claim 32

xviii. A showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30) having a first side (12; Figure 1; column 11; lines 10-30) and a second side (top of 15; Figure 1; column 11; lines 10-30), comprising: a first flow path (21; Figure 1; column 11; lines 10-30) through the showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30), the first flow path (21; Figure 1; column 11; lines 10-30) including a plurality of first apertures (14; Figure 1; column 11; lines 10-30) opening to the second side (top of 15; Figure 1; column 11; lines 10-30) of the showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30); a second flow path (22; Figure 1; column 11; lines 10-30) through the showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30), the second flow path (22; Figure 1; column 11; lines 10-30) isolated from the first flow path (21; Figure 1; column 11; lines 10-30) within the plate (structure 11-15; Figure 1; column 11; lines 10-30), the second flow path (22; Figure 1; column 11; lines 10-30) including a plurality of second apertures (15; Figure 1; column 11; lines 10-30) opening to the second side (top of 15; Figure 1; column 11; lines 10-30) of the showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30); and a plurality of third apertures (16; Figure 1; column 11; lines

10-30) extending through the showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30), the third apertures (16; Figure 1; column 11; lines 10-30) isolated from the first and second flow paths (21, 22; Figure 1; column 11; lines 10-30) within the showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 34

xix. The showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30) of claim 34, wherein the first (14) and second (15) apertures are interspersed and distributed across the second side (top of 15; Figure 1; column 11; lines 10-30) of the showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 35

xx. The showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30) of claim 35, wherein the first and second flow paths (21, 22; Figure 1; column 11; lines 10-30) each include a main passage (vertical entry portions 21, 22 inside 10; Figure 1; column 11; lines 10-30) and a plurality of distributor passages (horizontal entry portions 21, 22 inside 10; Figure 1; column 11; lines 10-30) branching from the main passage (vertical entry portions 21, 22 inside 10; Figure 1; column 11; lines 10-30), as claimed by claim 36

xxi. The showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30) of claim 37, wherein the first flow path (21; Figure 1; column 11; lines 10-30) includes a first main passage (straight portion of 21 within 10; Figure 1; column 11; lines 10-30) and a plurality of branching first distributor passages (14; Figure 1; column 11; lines 10-30) and the second flow path (22; Figure 1; column 11; lines 10-30) includes a second main passage (straight portion of 22 within 10; Figure 1; column 11; lines 10-30) and a

plurality of branching second distributor passages (15; Figure 1; column 11; lines 10-30), as claimed by claim 39

xxii. The showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30) of claim 39, further comprising a first bore (14; Figure 1; column 11; lines 10-30) extending from an edge of the plate (structure 11-15; Figure 1; column 11; lines 10-30) into fluid communication with the first main passage (straight portion of 21 within 10; Figure 1; column 11; lines 10-30) and a second bore (15; Figure 1; column 11; lines 10-30) extending from an edge of the plate (structure 11-15; Figure 1; column 11; lines 10-30) into fluid communication with the second main passage (straight portion of 22 within 10; Figure 1; column 11; lines 10-30), as claimed by claim 40

xxiii. The showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30) of claim 39, wherein the first and second main passages (straight portion of 21, 22 within 10; Figure 1; column 11; lines 10-30) extend parallel to one another proximate opposite ends of the plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 41

xxiv. The showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30) of claim 41, wherein the first (horizontal portion of 14) and second (horizontal portion of 15) distributor passages extend parallel to one another and perpendicular to the first and second main passages (straight portion of 21, 22 within 10; Figure 1; column 11; lines 10-30), the first (horizontal portion of 14) and second (horizontal portion of 15) distributor passages alternating with one another along an axis of the main passages (vertical entry portions 21, 22 inside 10; Figure 1; column 11; lines 10-30), as claimed by claim 42

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 10, 12, 22-29, 33, 37, 38, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heming; Martin et al. (US 6025013 A) in view of Oda; Masao et al. (US 5010842 A). Heming is discussed above. Heming further teaches the showerhead assembly (10-12; Figure 1; column 11; lines 10-30) of claim 27, wherein the first and second networks of passages (21, 22) comprise grooves (passages 14, 15) formed in the first side (12; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 28.

Heming does not teach:

i. The apparatus (Figure 1; column 11; lines 10-30) of claim 10, further comprising a top plate having a first side and a second side, the second side of the top plate fitting with and sealing against the first side (12; Figure 1; column 11; lines 10-30) of the exhaust plate (10; Figure 1; column 11; lines 10-30), thereby sealing and defining an exhaust space within the recess (16; Figure 1; column 11; lines 10-30) of the exhaust plate (10; Figure 1; column 11; lines 10-30), as claimed by claim 10

ii. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, wherein the first plurality of apertures (14; Figure 1; column 11; lines 10-30) are distributed along a plurality of parallel lines and the second plurality of apertures (15; Figure 1; column 11; lines 10-30) (16) are distributed across a plurality of parallel lines alternated with the parallel lines of

the first plurality of apertures (14; Figure 1; column 11; lines 10-30), as claimed by claim 12

iii. The apparatus (Figure 1; column 11; lines 10-30) of claim 21, wherein the grooves (passages 14, 15) comprise rounded bottoms, as claimed by claim 22

iv. The apparatus (Figure 1; column 11; lines 10-30) of claim 21, further comprising first and second holes through an edge of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), the first and second holes communicating with the grooves (passages 14, 15) of the first and second passages (bifurcated 21, 22 within 10; Figure 1; column 11; lines 10-30), respectively, as claimed by claim 23

v. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, wherein the first (14) and second (15) apertures (Figure 1; column 11; lines 10-30) further comprise countersinks widening the first (14) and second (15) apertures (Figure 1; column 11; lines 10-30) at the second side (top of 15; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 24

vi. The apparatus (Figure 1; column 11; lines 10-30) of claim 24, further comprising countersinks widening the third apertures (16; Figure 1; column 11; lines 10-30) at the second side (top of 15; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 25

vii. An apparatus (Figure 1; column 11; lines 10-30) for depositing a thin film on a substrate (1; Figure 1; column 11; lines 10-30), comprising: a reaction chamber (4; Figure 1; column 11; lines 10-30) (4; Figure 1; column 11; lines 10-30) having a reaction space (between 2 and 11; Figure 1; column 11; lines 10-30); a substrate support (5; Figure 1;

column 11; lines 10-30) , disposed within the reaction space (between 2 and 11; Figure 1; column 11; lines 10-30); a first plate (structure 11-15; Figure 1; column 11; lines 10-30) positioned above the substrate support (5; Figure 1; column 11; lines 10-30) , the first plate (structure 11-15; Figure 1; column 11; lines 10-30) having: a first gas inlet (21; Figure 1; column 11; lines 10-30) fluidly connected to a first plurality of apertures (14; Figure 1; column 11; lines 10-30) via a first gas pathway (portion 21 inside 10-12; Figure 1; column 11; lines 10-30); a second gas inlet (22; Figure 1; column 11; lines 10-30) fluidly connected to a second plurality of apertures (15; Figure 1; column 11; lines 10-30) via a second gas pathway (portion 22 inside 10-12; Figure 1; column 11; lines 10-30) , wherein the first and second pathways are machined into the first plate (structure 11-15; Figure 1; column 11; lines 10-30); a third apertures (13; Figure 1; column 11; lines 10-30) allowing gas to pass through the first plate (structure 11-15; Figure 1; column 11; lines 10-30); and a second plate (10; Figure 1; column 11; lines 10-30) fixed to a gas outlet (16; Figure 1; column 11; lines 10-30), positioned above the first plate (structure 11-15; Figure 1; column 11; lines 10-30), having a plurality of apertures allowing gas existing between the first plate (structure 11-15; Figure 1; column 11; lines 10-30) and the second plate (10; Figure 1; column 11; lines 10-30) to flow to the gas outlet (16; Figure 1; column 11; lines 10-30) - claim 26

viii. A showerhead assembly (10-12; Figure 1; column 11; lines 10-30) for a vapor deposition chamber (4; Figure 1; column 11; lines 10-30), comprising: a gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) having a thickness between a first side (12; Figure 1; column 11; lines 10-30) and a second side (top of 15; Figure 1;

column 11; lines 10-30), the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) defining a first network of passages (14; Figure 1; column 11; lines 10-30) in fluid communication with a first gas inlet (21; Figure 1; column 11; lines 10-30) and a second network of passages (15; Figure 1; column 11; lines 10-30) in fluid communication with a second gas inlet (22; Figure 1; column 11; lines 10-30) , the first and second network of passages including a plurality of first (14) and second (15) apertures opening from the first (21) and second (22) network of passages, respectively, to the second side (top of 15; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), the first (14) and second (15) apertures being interspersed and spaced across the second side (top of 15; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) further including third apertures (16; Figure 1; column 11; lines 10-30) extending from the first side (12; Figure 1; column 11; lines 10-30) to the second side (top of 15; Figure 1; column 11; lines 10-30) through the thickness of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) and being isolated from the first (21) and second (22) network of passages; and an exhaust plate (10; Figure 1; column 11; lines 10-30) having a plurality of exhaust apertures (16; Figure 1; column 11; lines 10-30) therein, the exhaust plate (10; Figure 1; column 11; lines 10-30) configured to mate with the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) and align the exhaust apertures (16; Figure 1; column 11; lines 10-30) with the third apertures (16; Figure 1;

column 11; lines 10-30) of the exhaust plate (10; Figure 1; column 11; lines 10-30) - claim 27

ix. The showerhead assembly (10-12; Figure 1; column 11; lines 10-30) of claim 28, wherein the first and second gas inlets (21, 22; Figure 1; column 11; lines 10-30) comprise holes machined into an edge of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) and in fluid communication with the first (21) and second (22) network of passages, respectively, as claimed by claim 29

x. The showerhead assembly (10-12; Figure 1; column 11; lines 10-30) of claim 32, further comprising a top plate having a thickness between a first side (12; Figure 1; column 11; lines 10-30) and a second side (top of 15; Figure 1; column 11; lines 10-30), the second side (top of 15; Figure 1; column 11; lines 10-30) of the top plate configured to mate with and seal against the first side (12; Figure 1; column 11; lines 10-30) of the exhaust plate (10; Figure 1; column 11; lines 10-30), thereby forming an exhaust space within the recess (16; Figure 1; column 11; lines 10-30) of the exhaust plate (10; Figure 1; column 11; lines 10-30), as claimed by claim 33

xi. The showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30) of claim 35, wherein the first and second flow paths (21, 22; Figure 1; column 11; lines 10-30) each include a plurality of connected surface grooves, as claimed by claim 37

xii. The showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30) of claim 37, wherein each of the surface grooves includes a rounded groove bottom, as claimed by claim 38

xiii. The showerhead plate (structure 11-15; Figure 1; column 11; lines 10-30) of claim 34, wherein each of the apertures includes a countersink, as claimed by claim 43

Oda teaches an apparatus (Figure 4,9) comprising a top plate (15; Figure 4) and a gas exchange plate (40; Figure 4, 9). Oda further teaches his gas exchange plate with rounded bottom grooves / countersinks (bottom portion of 16; Figure 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Oda's top plate and add additional holes / apertures to Heming's showerhead assembly.

Motivation to add Oda's top plate and add additional holes / apertures to Heming's showerhead assembly is for gas "uniformizing" as taught by Oda (column 3, line 13; column 1; lines 65-68). Further, it is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04).

Claims 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heming; Martin et al. (US 6025013 A) in view of Kobayashi; Norio (US 5370709 A). Heming is discusses above. Heming does not teach:

i. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, wherein the substrate holder (5; Figure 1; column 11; lines 10-30) is a platform comprising a heated susceptor plate (structure 11-15; Figure 1; column 11; lines 10-30), as claimed by claim 14

ii. The apparatus (Figure 1; column 11; lines 10-30) of claim 1, wherein the substrate holder (5; Figure 1; column 11; lines 10-30) holds the substrate (1; Figure 1; column 11; lines 10-30) in place by operation of the Bernoulli principle, as claimed by claim 15

Kobayashi teaches a heated Bernoulli chuck (Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Heming's substrate support (5; Figure 1; column 11; lines 10-30) with Kobayashi teaches a heated Bernoulli chuck.

Motivation to replace Heming's substrate support (5; Figure 1; column 11; lines 10-30) with Kobayashi teaches a heated Bernoulli chuck is for reducing dust contamination during processing as taught by Kobayashi (column 2, lines 55-63).

Claims 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heming; Martin et al. (US 6025013 A) in view of Olgado; Donald J. K. et al. (US 6736408 B2). Heming is discussed above. Heming does not teach:

i. The apparatus (Figure 1; column 11; lines 10-30) of claim 16, wherein the substrate holder (5; Figure 1; column 11; lines 10-30) is a vacuum chuck, as claimed by claim 17

ii. The apparatus (Figure 1; column 11; lines 10-30) in claim 1, wherein the gas outlet (16; Figure 1; column 11; lines 10-30) communicates with a venturi, as claimed by claim 19

Olgado teaches a wafer vacuum chuck (Figure 1) including a venturi (78; Figure 2) for process exhaust.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Heming's substrate support (5; Figure 1; column 11; lines 10-30) with Olgado's vacuum chuck, and add Olgado's venturi for process exhaust.

Motivation to replace Heming's substrate support (5; Figure 1; column 11; lines 10-30) with Olgado's vacuum chuck, and add Olgado's venturi for process exhaust is for reducing particle contamination as taught by Olgado (column 1; line 66 – column 2, line 5).

(10) Response to Argument

Applicant states:

"

Thus, the structure disclosed by Hemming is entirely different than the structure disclosed in the present application. Specifically, instead of a exchange plate with passages formed therein, Hemming merely discloses a plurality of concentric cylinders which are capped by a plate 12 with holes. See e.g., FIGS. 7a and 7b and the deformable cylinder 54. The outer exhaust section 16 is positioned on the outside of the sections 13, 14, 15 for the feed gases. Thus, Hemming merely discloses a plurality of concentric cylinders which are capped by a plate 12 with holes.

"

In response, the Examiner emphasizes that Applicant's purported differences between the structure of Hemming and structure of the present invention are differences that are strictly attributed to the breadth of the claims. By exercising the broadest reasonable interpretation of the pending claims, Hemming's "plurality of concentric cylinders which are capped by a plate 12 with holes" is directly analogous to the *claimed* invention being: a gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) ... comprising: a plurality of first passages (bifurcated 21 within 10; Figure 1; column 11; lines 10-30) machined therein being in fluid communication with a first reactant gas source (28; Figure 1; column 11; lines 10-30)...

The Examiner emphasizes that Applicant's claimed "machined therein" is a product-by-process limitation. Because the examiner has provided a rationale tending to show that the claimed product (a gas exchange plate) appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence

establishing an unobvious difference between the claimed product and the prior art product (structure 11-15; Figure 1; column 11; lines 10-30). In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Refer to MPEP 2113.

With reference to Hemming, the fact that "The outer exhaust section 16 is positioned on the outside of the sections 13, 14, 15 for the feed gases.", Applicant has not provided any rationale why such a structure in Hemming would render any claim rejected under Hemming as not anticipated or nonobvious. Further, and within the context of claim 1, section 16 is the claimed plurality of third apertures (16; Figure 1; column 11; lines 10-30) extending from the first side (12; Figure 1; column 11; lines 10-30) to the second side (top of 15; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30), allowing gas to pass there through. Again, the claimed apparatus of the present invention has a claim breadth that offers anticipation under Hemming with the broadest reasonable interpretation.

Importantly, Applicant himself offers parity between the breadth of the claimed "plate" and "holes": "Thus, Hemming merely discloses a plurality of concentric cylinders which are capped by a plate 12 with holes." Thus Hemming's conduits 10, 13-16 are agreed to be "holes" and Hemming's structure 11 is a plate implying that the remaining structure affixed to 11 is also a "plate".

Applicant states:

"

At paragraph 16, the final Office Action states that "a plurality of centric cylinders which are capped by a plate 12 with holes is not a feature that reads away from Applicant's claimed invention." Applicant disagrees. Hemming does not discloses a plate with a plurality of first and

second passages machined therein and first and second apertures communicating with the first and second passages as recited in Claim 1. That is, the concentric cylinders are not a plate with machined first and second passages machined therein. The Final Office Action at page 5 cites Figure 1, structure 11-15 and column 11, lines 10-30 but there is simply no disclosure in these sections of Hemming of the plate with the machined passages as recited herein. Thus, Hemming can not anticipate Claim 1.

"

As first emphasized above, Applicant envelops the claimed structure with the "machined therein" product-by-process clause. "Machined" is indeed a verb, and, within the context of the claimed invention, only functions to describe *how* the claimed apparatus is *manufactured.* The Examiner emphasizes that Applicant's claimed "machined therein" is a product-by-process limitation. Because the examiner has provided a rationale tending to show that the claimed product (a gas exchange plate) appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product (structure 11-15; Figure 1; column 11; lines 10-30). In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Refer to MPEP 2113.

Applicant states:

"

With respect to the limitation that the first and second flow paths are isolated from each other in within the plate, the Examiner again at page 11 simply cites to the gas nozzle structure 10 and 11

of Hemming. As noted above, Applicant submits that this does not meet the claim limitations of this claim.

"

In response, the Examiner believes that his interpretation of Hemming should be sustained: "the second flow path (22; Figure 1; column 11; lines 10-30) isolated from the first flow path (21; Figure 1; column 11; lines 10-30) within the plate (structure 11-15; Figure 1; column 11; lines 10-30)". Indeed, Hemming exhibits numerous redundant structure emphasizing gas separation up until the plural gas sources are injected inside the chamber to create the desired deposited film. For example, each of the "non-layer forming gas 27" and the "gas source 28" have three dedicated mass flow controllers for each of the three isolated paths 21, 21a, and 22. Indeed from only the shown structure an artisan of ordinary skill would appreciate that Hemming is not only influencing control on the *concentration* of gas from 28 (by dilution with non-layer forming gas 27), but is also influencing control on the spatial distribution of said prepared gas over the substrate 3. This is supported by Hemming in numerous discussions of uniform thickness of deposition, as a result-effective-variable, including in column 4, lines 14-30.

Applicant further states:

"

In general, Applicant respectfully submit that the Examiner is unreasonably disregarding several limitations in the claims and/or reading limitations so broadly that they simply have no meaning. As stated in M.P.EP. 2111, "the pending claims must be given therein broadest reasonable interpretation consistent with the specification." (emphasis added). The broadest reasonable

interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach. Id

"

In response, although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The Examiner's interpretation of the breadth of the claims is within the level of ordinary skill in the art. Further, the Examiner's detailed claim-element by claim-element comparison of Hemming's apparatus clearly illustrates the care and attention the Examiner accorded each claimed feature and associated clauses.

With respect to the Examiner's obviousness rejection of Hemming in view of Oda, Applicant states:

"

Hemming has been discussed above. Oda, in turn, merely discloses a combination of pipes 20a. As with Hemming, Oda does not disclose, teach or suggest a gas exchange plate with passages and apertures for the first and second reactant and exhaust apertures that extend through the exchange plate. Accordingly, the gas distribution structure disclosed by Oda is noticeably more complicated than the structure disclosed in the present application. Moreover, the exhaust path in Oda is located below the pipes 20a

"

In response, the Examiner emphasizes that Hemming anticipates the stated feature of "a gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30) with passages (bifurcated 21/21a/22 within 10; Figure 1; column 11; lines 10-30) and apertures (13-15; Figure 1; column

11; lines 10-30) for the first and second reactant (gas from 28 in any of 21,21a,22) and exhaust apertures (16; Figure 1; column 11; lines 10-30) that extend through the exchange plate (structure 11-15; Figure 1; column 11; lines 10-30)".

With respect to claim 26, Applicant states:

"

At page 16, the Final Office Action states that Hemming discloses the above noted features. However, again, Applicant respectfully submits that neither Hemming nor Oda discloses a first plate with first and second passages machined therein. Hemming and Oda also do not disclose "a second plate positioned above the first plate having a plurality of apertures along gas existing between the first and second plate to flow to the gas outlet." The Examiner identifies structure 10 in Hemming which is identified as a gas section nozzle and is not a plate as recited in Claim 26.

"

In response, the Examiner has already addressed the teachings in Hemming of a first plate with first and second passages machined therein. See above. With respect to the claim requirement of "a second plate positioned above the first plate having a plurality of apertures along gas existing between the first and second plate to flow to the gas outlet", the Examiner has indeed gone on record as showing where in Hemming there is a teaching of:

a second plate (10; Figure 1; column 11; lines 10-30) fixed to a gas outlet (16; Figure 1; column 11; lines 10-30), positioned above the first plate (structure 11-15; Figure 1; column 11; lines 10-30), having a plurality of apertures allowing gas existing between the first plate (structure 11-15; Figure 1; column 11; lines 10-30) and the second plate (10; Figure 1; column 11; lines 10-30) to flow to the gas outlet (16; Figure 1; column 11; lines 10-30)

Applicant's statement that "structure 10 in Hemming which is identified as a gas section nozzle and is not a plate as recited in Claim 26" is reconciled by the fact that the Hemming does not provide a distinctive reference number for the aggregate structure defining element 10 and all other gas conduits 13-16. The Examiner cited reference 10 as the closest label point defining the aggregate structure of elements 10 and all other gas conduits 13-16. Further, the Examiner notes that Applicant's own statements at page 14, last sentence, last paragraph offers parity between the breadth of the claimed "plate" and "holes": "Thus, Hemming merely discloses a plurality of concentric cylinders which are capped by a plate 12 with holes." As a result, Hemming's conduits 10, 13-16 are agreed to be "holes" and Hemming's structure 11 is a plate implying that the remaining structure affixed to 11 is also a "plate". The Examiner emphasizes that Hemmings drawings are not to scale. Further, proportions of features in a drawing are not evidence of actual proportions when drawings are not to scale. Because the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value. However, the description of the article pictured can be relied on, in combination with the drawings, for what they would reasonably teach one of ordinary skill in the art. (In re Wright,193 USPQ 332 (CCPA 1977). MPEP 2125.

With respect to the Examiner's rejection of claim 27, Applicant states:

"

With respect to the limitation that the first and second apertures are "interspersed", the Final Office Action cites at page 17 to top of 15, Figure 1 and column 11, lines 10-30 of Oda. However, Applicant does not find any disclosure or suggestion of interspersing apertures that are in communication with different networks of passages as recited in this claim. Thus, the Final

Office Action has not provided a prima facie case of obviousness by identifying a combination of references that disclose, teach or suggest all of the limitations of the clams.

"

In response, the Examiner's rejection of claim 27 says, in part, Hemming indeed teaches the first (14) and second (15) apertures being interspersed[1] and spaced across the second side (top of 15; Figure 1; column 11; lines 10-30) of the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30). Further, by definition of interspersed, Hemming's dividing circular plates are the dividing lines for the intervals interspersing the first (14) and second (15) apertures among the gas exchange plate (structure 11-15; Figure 1; column 11; lines 10-30).

The remainder of Applicant's arguments are centered on arguments already presented above and addressed by the Examiner.

Applicant requests that the Examiner's provisional rejection on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-43 of copending Application No. 10/428,207 be held in obeyance. The Examiner maintains said rejections on the grounds already presented.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer. There is a pending BPAI decision of copending Application No. 10/428,207. The Examiner has based his nonstatutory obviousness-type double patenting of pending claims 1-43 in this application on copending Application No. 10/428,207.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Rudy Zervigon, Primary Examiner Art Unit 1792 12/20/7

Conferees:

Parviz Hassanzadeh, SPE, Art Unit 1792

/Romulo H. Delmendo/

Romulo H. Delmendo, Acting Appeal Specialist

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[1] Interspersed, *transitive verb* 1. to place something at intervals in or among. http://www.m-w.com/dictionary/interspersed